

What is claimed is:

1. A control apparatus for automatically stopping and starting an internal combustion engine mounted in a vehicle, comprising:
 - 5 a first controller which, when a predetermined stopping condition has been fulfilled while the engine is idling and a learning execution condition for executing learning of a control amount of the internal combustion engine has been fulfilled, automatically stops the internal combustion engine based on both the completion of learning based on the learning execution condition and the duration of
10 time that has passed after the predetermined stopping condition has been fulfilled; and
a second controller which automatically starts the internal combustion engine which has been automatically stopped when a predetermined starting condition has been fulfilled.
- 15 2. The control apparatus according to claim 1, wherein the first controller automatically stops the internal combustion engine when the learning based on the learning execution condition is complete, regardless of the duration of time that has passed after the predetermined stopping condition has been fulfilled.
- 20 3. The control apparatus according to claim 1, wherein the first controller automatically stops the internal combustion engine when the stopping condition has continued to be fulfilled for a predetermined period of time, when the learning based on the learning execution condition is not complete.
- 25 4. The control apparatus according to claim 1, wherein the first controller automatically stops the internal combustion engine when the learning execution condition has not been fulfilled, regardless of the duration of time that has passed after the predetermined stopping condition has been fulfilled.
- 30 5. The control apparatus according to claim 1, wherein the control amount of the internal combustion engine to be learned is a plurality of control amounts, and completion of the learning is the completion of all of the learning of the plurality of control amounts to be learned.

6. The control apparatus according to claim 5, wherein the plurality of control amounts includes at least one of an air-fuel ratio and an intake air flow rate necessary for maintaining idle speed.

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7. The control apparatus according to claim 1, wherein the first controller prohibits the internal combustion engine from automatically stopping when there is no history of the learning based on the learning execution condition being completed, regardless of the duration of time that has passed after the predetermined stopping condition has been fulfilled.

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8. A control method of an internal combustion engine mounted in a vehicle, comprising:

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determining whether a predetermined stopping condition for automatically stopping the internal combustion engine during idling has been fulfilled;

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determining whether a learning execution condition for executing learning of a control amount of the internal combustion engine has been fulfilled, when it has been determined that the predetermined stopping condition has been fulfilled;

determining whether the learning based on the learning execution condition is complete;

measuring a duration of time that has passed after the predetermined stopping condition has been fulfilled;

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automatically stopping the internal combustion engine based on both the completion of the learning based on the learning execution condition and the duration of time that has passed after the predetermined stopping condition has been fulfilled, when it has been determined that the learning execution condition has been fulfilled;

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determining whether a predetermined starting condition for starting the internal combustion engine that has been automatically stopped has been fulfilled; and

automatically starting the internal combustion engine when the predetermined starting condition has been fulfilled.

5 9. The control method according to claim 8, wherein the internal combustion engine is automatically stopped when it has been determined that the learning based on the learning execution condition is complete, regardless of the duration of time that has passed after the predetermined stopping condition has been fulfilled.

10 10. The control method according to claim 8, wherein the internal combustion engine is automatically stopped when the stopping condition has continued to be fulfilled for a predetermined period of time, when it has been determined that the learning based on the learning execution condition is not complete.

15 11. The control method according to claim 8, wherein the internal combustion engine is automatically stopped when it has been determined that the learning execution condition has not been fulfilled, regardless of the duration of time that has passed after the predetermined stopping condition has been fulfilled.

20 12. The control method according to claim 8, wherein the control amount of the internal combustion engine to be learned is a plurality of control amounts, and completion of the learning is the completion of all of the learning of the plurality of control amounts to the learned.

25 13. The control method according to claim 12, wherein the plurality of control amounts includes at least one of an air-fuel ratio and an intake air flow rate necessary for maintaining idle speed.

30 14. The control method according to claim 8, further comprising the step of:

determining whether there is a history of the learning based on the learning execution condition being completed,

wherein the internal combustion engine is prohibited from automatically stopping when it has been determined that there is no history of the learning based on the learning execution condition being completed, regardless of the duration of time that has passed after the predetermined stopping condition has been fulfilled.

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